

A new species of the genus *Thiotricha* (Lepidoptera, Gelechiidae) associated with *Symplocos prunifolia* (Symplocaceae) from Japan, with a biological note on the immature stages and a taxonomic comment on the Japanese *Thiotricha* species

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Abstract A new gelechiid species *Thiotricha prunifolivora* associated with *Symplocos prunifolia* (Symplocaceae) is described from Japan with illustrations of adult, genitalia and immature stages. A biological note is given with photos of each immature stage. A taxonomic comment on the Japanese *Thiotricha* species is also given.

Key words Gelechiidae, *Thiotricha*, new species, *Symplocos prunifolia*, Japan, biology, *Polyhymno*.

Introduction

The genus *Thiotricha* Meyrick, 1886 comprises more than 90 species and has overwhelmingly Indo-Australian distribution (Robinson *et al.*, 1994). Most larvae of this genus as far as known make a portable case and feed on flowers and seeds (Robinson *et al.*, 1994).

One of us (Fujiwara) found many larvae making portable cases on the flower buds of *Symplocos prunifolia* Sieb. et Zucc. (Symplocaceae) in early spring in north Osaka. Examination of morphological characters of the adults which emerged from the portable cases revealed that it is a new species belonging to the genus *Thiotricha*. In this study we describe and illustrate the adults, genitalia, larvae and pupae of new species in detail. We also give a biological note on this new species and a taxonomic comment on the Japanese species of the genus *Thiotricha*.

The holotype and all paratype specimens of this new species are preserved in Entomological Laboratory, Osaka Prefecture University.

Taxonomic note on Japanese species of *Thiotricha*

Moriuti (1982) assigned the Japanese species of the genus *Thiotricha* to the genus *Polyhymno* Chambers, 1874 on the basis of the male genital characters. After then, Japanese taxonomists followed Moriuti (1982) and 15 species are recorded under *Polyhymno* from Japan (Suzuki and Komai, 1984; Oku, 2003). However, no taxonomist used *Polyhymno* to the Palaearctic and Oriental species in the recent taxonomic study (Huemmer, 1993; Robinson *et al.*, 1994; Omelko, 1999; Bland, 2002; Li, 2002; Park, 2004).

In the forewing venation, R_5 is absent in *Thiotricha*, but R_5 is stalked or coincident with R_4 in *Polyhymno* (Meyrick, 1925). Judging from figures given by Clarke (1969) and Hodges (1998), 4 R veins of the forewing are present in the type species of *Thiotricha*, but 5 R veins are present in the type species of *Polyhymno*. Although there is no comparative study on the types of *Thiotricha* and *Polyhymno*, these genera are clearly distinguishable by the venation of the forewing. For comparing with the new species, we examined the venation

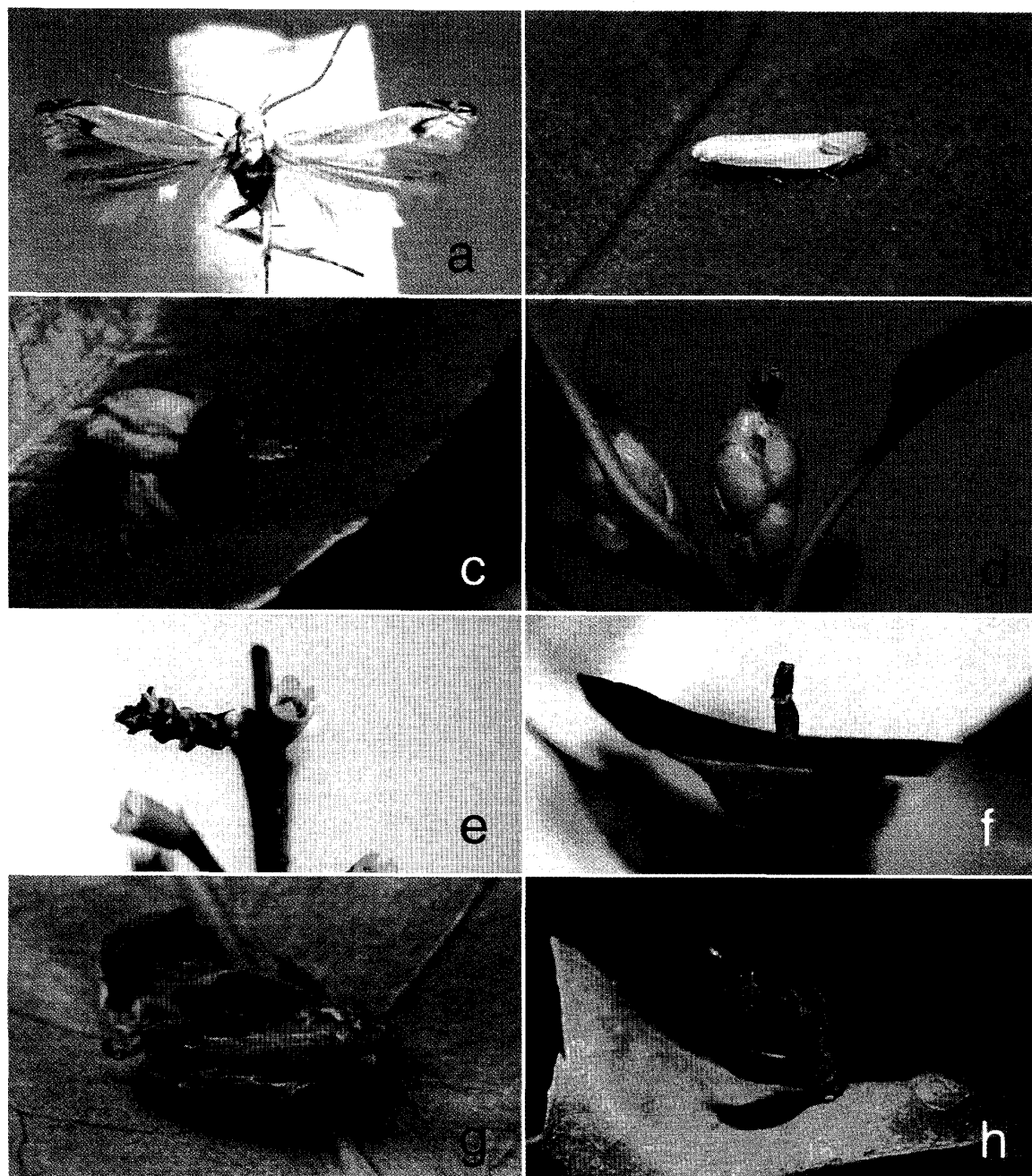


Fig. 1. *Thiotricha prunifolivora* sp. n. and its habitat. a. Holotype, ♂. b. Resting adult. c. Larva carrying the portable case. d. Portable case of the overwintering generation attached on the flower bud of *Symplocos prunifolia*. e. Portable case of the first generation attached on the developing seed of *Symplocos prunifolia*. f. Portable case of the second generation attached on the underside of a leaf of *Symplocos prunifolia*. g. Pupa. h. A projecting exuvia left by emerged adult. b, c, d, g: photos by Dr T. Saito.

of *Polyhymno pontifera* (Meyrick), *P. obliquata* (Matsumura), *P. trapezoidella* (Caradja) and *P. pancratiastis* (Meyrick). The number of R veins is 4 in the all examined species. Although we could not examine *Polyhymno* sp. 1 and *P.* sp. 2 of Oku, (2003), we treat tentatively the Japanese representatives as *Thiotricha* mainly following Omelko (1999) and Park (2004) (Table 1).

Table 1. Check list of the Japanese *Thiotricha*.

Species	Japanese name
<i>Thiotricha pontifera</i> Meyrick, 1932	Suji-usuki-kibaga
<i>Thiotricha celata</i> Omelko, 1993	Kagitsuma-ususuji-kibaga
<i>Thiotricha synodonta</i> Meyrick, 1936	Kagitsuma-suji-kibaga
<i>Thiotricha obliquata</i> (Matsumura, 1931)	Kagitsuma-shima-kibaga
<i>Thiotricha</i> sp. 1 of Oku (2003)	Kagitsuma-obi-kibaga
<i>Thiotricha corylella</i> Omelko, 1993	Kagitsuma-futoobi-kibaga
<i>Thiotricha</i> sp. 3 of Oku (2003)	Kagitsuma-dougane-kibaga
<i>Thiotricha tylephora</i> Meyrick, 1935	
<i>Thiotricha indistincta</i> Omelko, 1993	Kagitsuma-usucha-kibaga
<i>Thiotricha fusca</i> Omelko, 1993	Kagitsuma-kuro-kibaga
<i>Thiotricha trapezoidella</i> (Caradja, 1920)	Kurumi-shintome-kibaga
<i>Thiotricha pancratiastis</i> Meyrick, 1921	Yamamomo-kibaga
<i>Thiotricha subocellea</i> (Stephens, 1834)	Usuten-kibaga
<i>Thiotricha attenuata</i> Omelko, 1993	Tsumasuji-kibaga
<i>Thiotricha</i> sp. of Suzuki & Komai (1984)	Todomatsu-tsutsu-mino-kibaga

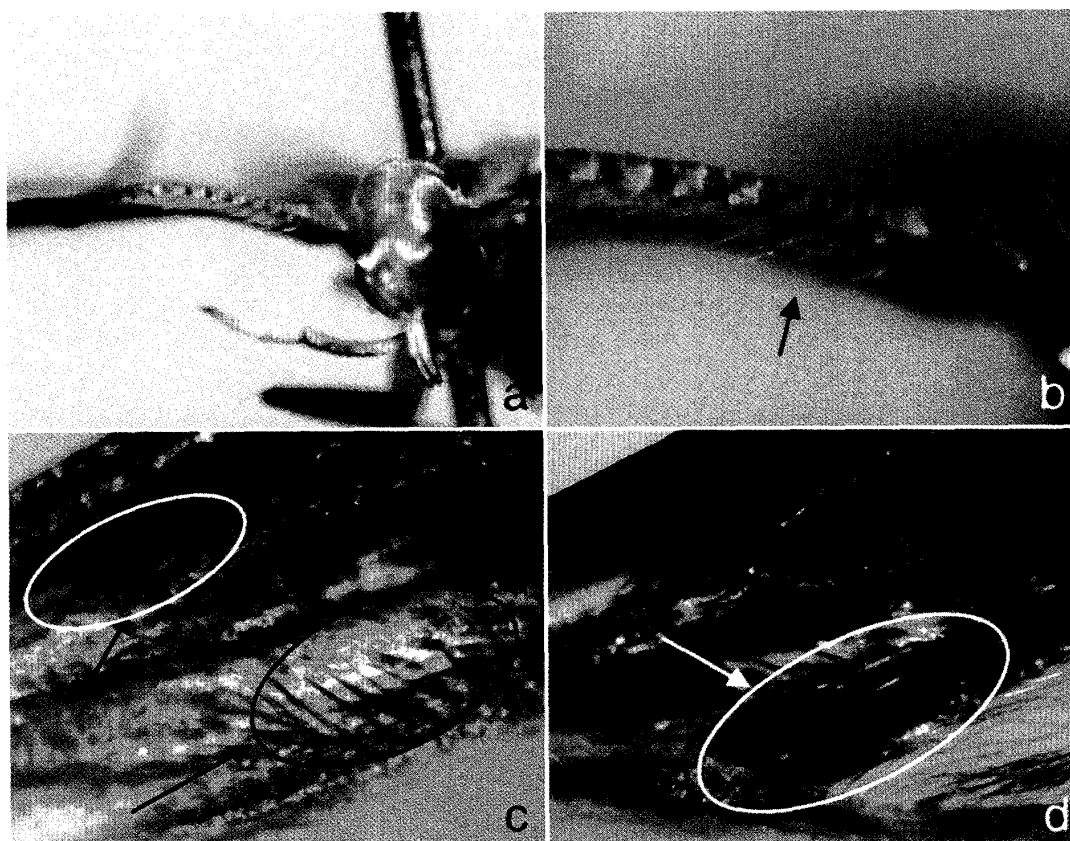


Fig. 2. Head and wing of *Thiotricha prunifolivora* sp. n. a. Head. b. Antenna of male. Arrow indicates long fine cilia. c. Underside of male forewing. Arrows and circles indicate subradial retinaculum (white circle) and group of needle-like scales attached around 1A+2A (black circle). d. Underside of fore- and hindwings. Arrow and circle indicate group of long robust hair-like scales on basal part of costa.

Description

Thiotricha prunifolivora sp. n. (Figs 1–9)

Adult (Figs 1a–b, 2–3)

Forewing length: holotype, 4.0 mm; ♂, 3.0–4.5 mm; ♀, 4.7–5.0 mm.

Head and face smooth, glossy white. Antenna filiform with long fine cilia on ventral surface in male, whitish ocher with fuscous annulation; scape whitish ocher. Labial palpus long, smooth; 2nd segment white with fuscous stripe on ventral surface; 3rd slightly shorter than 2nd, white, partly suffused ventrally with fuscous. Thorax and tegula glossy white. Legs whitish ocher; fore femur and tibia suffused inwardly with black; fore tarsus suffused with black, with whitish apical ring on each segment; mid tibia suffused dorsally with whitish hair-like scales, scattered with black scales on outer surface; mid tarsus suffused with black, with whitish apical ring on each segment; hind tibia suffused with whitish ocher hairs, scattered with black scales and hairs; hind tarsus suffused with black, with whitish apical ring on basal 3 segments. Forewing narrow, 11 veins; R_4+R_5 stalked with M_1 ; CuA_1 and CuA_2 clearly separated; retinaculum represented by a hook arising from Sc and a series of curved liner scales along R in male and 2 rows of apical curved liner scales along Sc and R in female; a group of needle-like scales attached around $1A+2A$ on underside; glossy white, with narrow black costal streak; a brownish oblique fascia running from just before apical 1/4 of costa to apical 1/3 of termen; a brownish triangular mark on costa from just beyond apical 1/4 to before apex cut by inwardly oblique strigula; a black bar at apex; a dark brownish circular mark on tornus; 2 narrow brownish streaks run from apical black bar to above and beneath margins of brownish tornal mark; cilia glossy white, with a basal fuscous line and an apical dark brownish line around apex. Hindwing narrow, trapezoidal, 8 veins; CuA_1 and CuA_2 parallel; female frenulum composed of 3 acanthi; a group of long robust hair-like scales on basal part of costa extending to forewing; pale grayish brown, suffused with grayish brown on costa and termen; cilia pale grayish brown, darker on costa and termen.

Pregenital abdomen (Fig. 4). Second sternite with a distinct pair of sternal venulae and apodemes; anterior margin concave, broadly sclerotized at middle, tapered laterally. Eighth sternite rather trapezoidal, with broadly concave anterior margin and almost straight posterior margin.

Male genitalia (Fig. 5). Uncus rectangular, densely hairy on dorsal and ventral surfaces; posterior margin slightly emarginate at middle, with a row of short stout setae on each lateral corner. Tegumen about 2.5 times length of uncus, with elliptical windows on posterior end and posterior 1/5; anterior margin deeply emarginate. Gnathos with long sclerotized hook; pillow-like culcitula present, with numerous short hairs. Valva narrow, rather S-shaped; slightly curved dorsally from base to 1/3 and curved ventrally from 1/3 to before middle, then slightly curved dorsally; apical 1/3 somewhat dilated, with rounded apical margin; sacculus almost triangular in lateral view, with short setae on ventral margin. Anellus with a pair of large digitate lobes bearing a long thorn-like process at posterior margin and long setae on inner surface. Saccus nearly triangular. Aedeagus slightly sinuate, with inflated basal 1/3, then abruptly slender.

Female genitalia (Fig. 6). Papilla analis nearly equal in length to apophysis posterioris, round, with many long and short setae over entire surface. Apophysis posterioris about 2 times length of apophysis anterioris. Eighth segment sclerotized laterally and weakly scler-

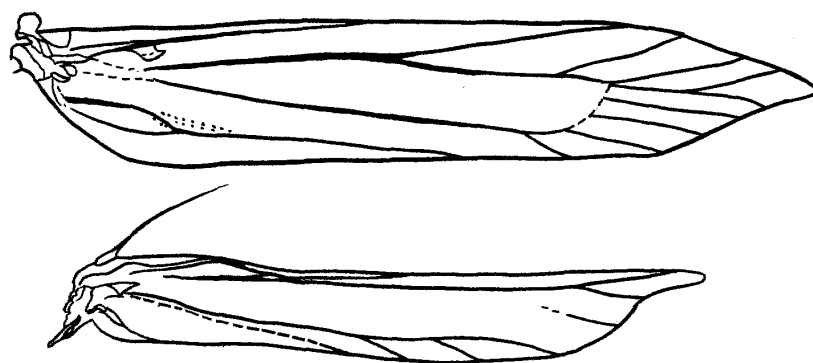


Fig. 3. Wing venation of *Thiotricha prunifolivora* sp. n.

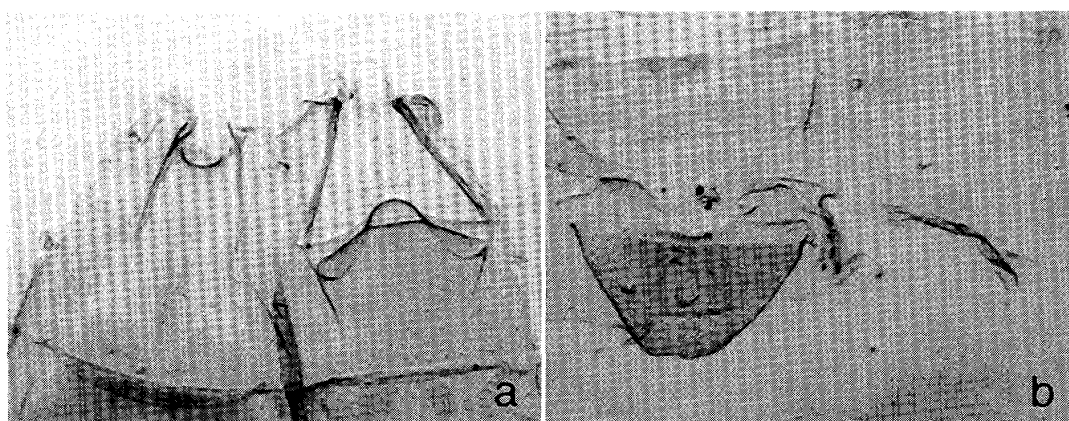


Fig. 4. Abdominal segments of *Thiotricha prunifolivora* sp. n. (tergites on the right, sternites on the left). a. Second abdominal segment. b. Eighth abdominal segment.

rotized dorsally; anterior margin of sternal region slightly concave at middle. Lamella antevaginalis sclerotized, narrow, crescent shaped. Ostium opening close to anterior margin of 8th sternite. Ductus bursae narrow, long, posterior 1/3 weakly sclerotized. Ductus seminalis arising from about posterior 1/3 of ductus bursae. Spermatheca forming single tube, without lagena. Corpus bursae oblong with no signum.

Material examined. Holotype ♂, labeled "JAPAN: Honshu, Osaka Pref., Takatsuki City, Bochikoen, 25. III. 2001, T. Ueda & Y. Fujiwara leg./No. 01-01, Host Plant: *Symplocos prunifolia* (Symplocaceae), Em. 27. IV-9. V. 2001 (genitalia No. OPU-TU 762)". Paratypes. HONSHU: 2 ♂, Nagasawa, Otowa Town, Aichi Pref., 28. V. 2001, T. Mano (genitalia No. OPU-TU 759); 2 ♂, Isejingu (Naiku), Ise City, Mie Pref., 23. VIII. 2003, T. Mano; 3 ♂, Oota Nishiki, Kisei Town, Mie Pref., 4. VIII. 2001, T. Mano (genitalia No. OPU-TU 760); 6 ♂ 4 ♀, same locality of holotype, 18. III. 2000 (larva col.), *ex Symplocos prunifolia* em. 5-13. IV. 2000 (genitalia Nos OPU-TU 741-744; wing preparation No. OPU-TUW 126; head No. OPU-TUH 19); 3 ♂ 7 ♀, same data as holotype (genitalia Nos OPU-TU 762, OPU-TU 765; wing preparation Nos OPU-TUW 132-135). RYUKYUS: 1 ♂, Hiji-Ohashi, Kunigami Vil., Okinawa Is., Okinawa Pref., 19. V. 1998, T. Ueda (genitalia No. OPU-TU 761).

Mature larva (Fig. 1c)

Length about 5 mm, slender. Head semiglobular; yellowish brown, with blackish pigmen-

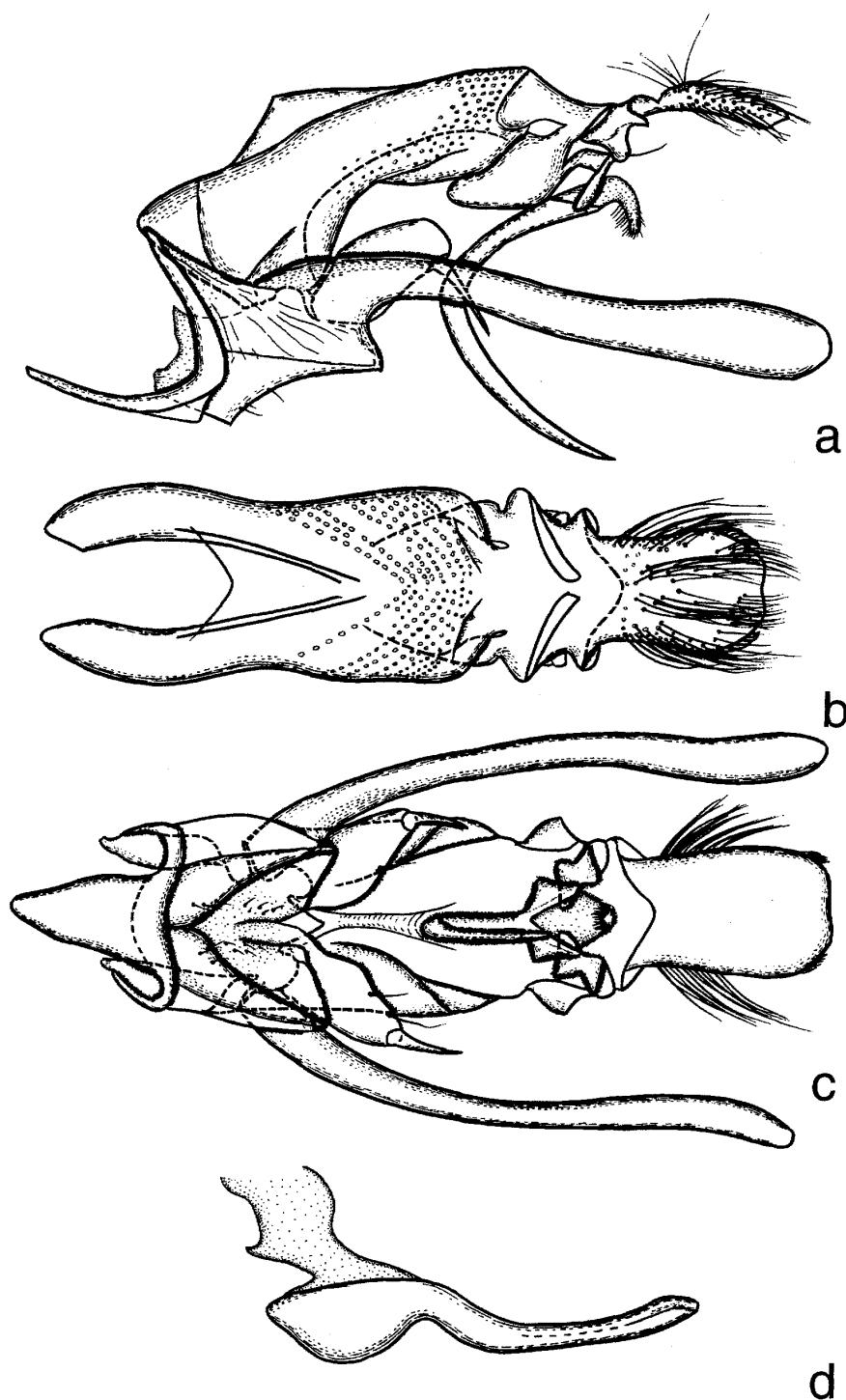


Fig. 5. Male genitalia of *Thiotricha prunifolivora* sp. n. a. Whole genitalia except aedeagus, lateral view. b. Uncus and tegumen, dorsal view. c. Whole genitalia except aedeagus, ventral view. d. Aedeagus, lateral view.

tations on ocellar area and on anterior margin of labrum. Prothoracic shield yellowish brown, with blackish brown caudal margin. Thoracic leg short, pale yellowish brown. Body creamy white. Pinaculum circular, blackish brown on thorax and abdominal segments 1, 2, 8, 9; paler on remaining abdominal segments. Anal shield heavily sclerotized,

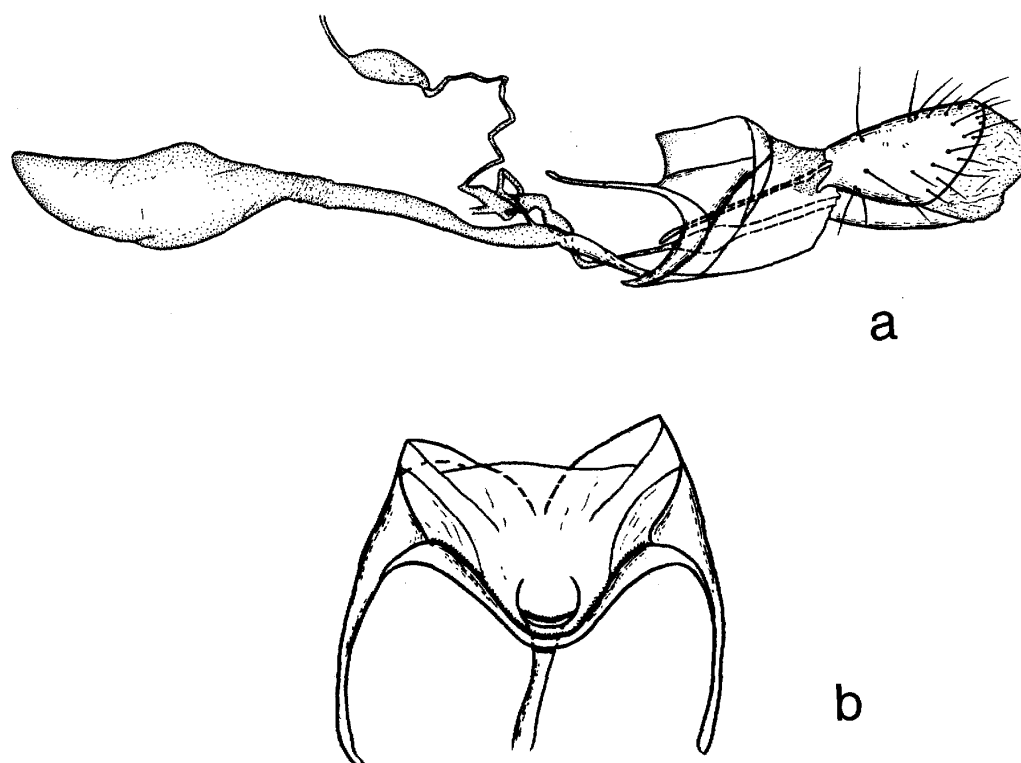


Fig. 6. Female genitalia of *Thiotricha prunifolivora* sp. n. a. Whole genitalia, lateral view. b. Eighth segment, ventral view.

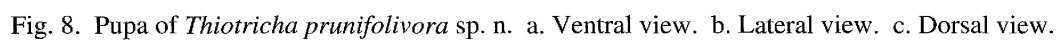
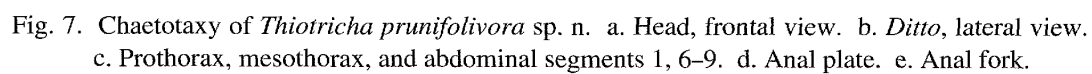
yellowish brown. Anal fork present, subrectangular with deeply emarginate posterior margin. Anal prolegs armed with many minute spines on dorsal surface. Crochets uniordinal; 11–13 in number on ventral prolegs, 14 on anal proleg.

Chaetotaxy (Fig. 7). Head with rather short AF1 and AF2; S3 very short, situated beneath ocellus 6. Prothorax with XD1, XD2, D1, D2, SD1, SD2 and MXD1 on thoracic shield; L group trisetose, on same pinaculum; SV group bisetose on same pinaculum. Meso- and metathorax with D1 and D2 on same pinaculum, arranged in vertical line; SD1 about 5 times length of SD2, on same pinaculum. Abdominal segment 1 with SD1 and SD2 on same pinaculum; SV group bisetose. Abdominal segments 2–7 with SD1 and SD2. Abdominal segments 8 and 9 with only SD1. Abdominal segments 2–6 with SV1, SV2 and SV3. Abdominal segment 7 with SV1 and SV2. Abdominal segments 8 and 9 with only SV1. Abdominal segment 9 with very short D1 situated anterior of D2; SD1 short, strong; L group bisetose.

Pupa (Figs 1e, 8–9)

Length about 3.5 mm, cylindrical. Color yellowish brown; dark brown before emergence. Vertex armed with many minute spines. Prothorax with a pair of triangular projections on anterolateral corners of tergite. Antenna never touch mesially. Forewing reaching 6th abdominal segment. Sixth and 7th abdominal segments armed with a row of tergal spines directed posteriorly on caudal margin. Seventh abdominal sternite with a pair of oval pads armed with a row of spines directed anteriorly. Tenth abdominal segment with a pair of tergal triangular projections at middle; no true cremaster present.

Larvae examined. JAPAN: Honshu: 1 ex., Bochi-koen, Takatsuki City, Osaka Pref., fixed



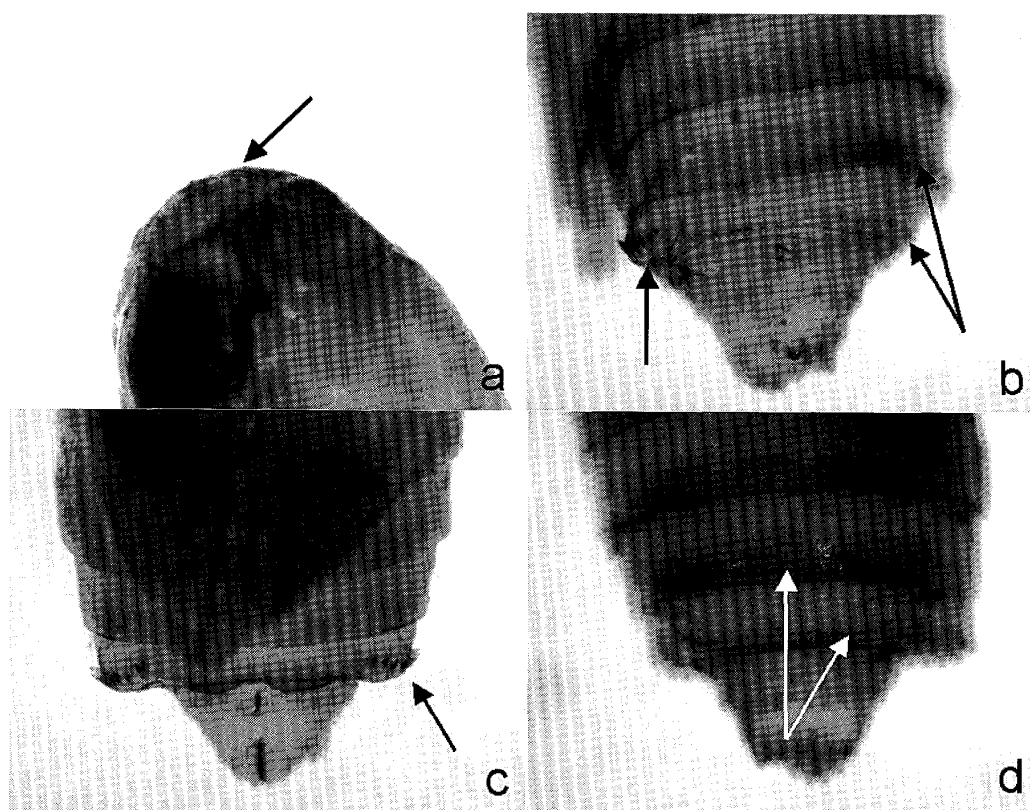


Fig. 9. Pupa of *Thiotricha prunifolivora* sp. n. a. Head, lateral view. Arrow indicates many minute spines on vertex. b. Sixth and 7th abdominal segments, lateral view. Arrows indicate oval pad armed with a row of spines and rows of tergal spines. c. Seventh abdominal segment, ventral view. Arrow indicates oval pad armed with a row of spines. d. Sixth and 7th abdominal segments, dorsal view. Arrows indicate a row of spines.

on 16. I. 1993, Y. Fujiwara; 1 ex., same locality, fixed on 21. II. 2000, Y. Fujiwara; 2 exs, same locality, fixed on 23. VI. 2002, Y. Fujiwara.

Pupae examined. JAPAN: Honshu: 2 exs, Bochi-koen, Takatsuki City, Osaka Pref., fixed on 14. V. 2000, Y. Fujiwara.

Distribution. Japan (Honshu, Ryukyus).

Biology (Figs 1b–h). Host plant: *Symplocos prunifolia* Sieb. et Zucc. (Symplocaceae). The new species has 3 generations in north Osaka in a year.

Larvae of the overwintering generation are found from late September to early March and adults appear from late March to early April. First generation larvae appear from early April to mid August. Their development takes 2 forms. Some individuals aestivate at larval stage and emerge from late August to early September. Others emerge in May. Second generation larvae are found from mid August to early September and adults emerge in September.

The egg is laid on the base of the flower bud or flower stalk singly. Hatching occurs 5–6 days after oviposition.

In the overwintering generation, the hatched larva penetrates the flower bud. After hollowing the flower bud, the larva uses it as a portable case and moves to other flower buds carry-

ing the case (Fig. 1c). The larva attaches the case to the apex of the flower bud with silk and penetrates the new bud (Fig. 1d). The larva repeats this process until pupation. In the first generation, the larva bores the developing seed and uses it as the portable case. The larva usually accumulates 5 developing seeds before pupation (Fig. 1e). In the second generation, the larva bores the developing seed at first. After feeding and accumulating several developing seeds (usually 2), the larva moves to the underside of the leaf carrying the portable case and attaches it with silk (Fig. 1f). The larva skeletonizes the leaf within the radius it can reach. Consequently, the leaf of the host plant bears several circular holes.

Pupation occurs in the portable case (Fig. 1g). The pupa protrudes its head or sometimes thorax from the end of the portable case before emergence (Fig. 1h). The adult (Fig. 1b) is attracted to light.

Remarks. Huemer (1993) revised the European species of the genus *Thiotricha* and defined the genus by the combination of the following characters: developed pterostigma in the forewing; bilobed 8th sternite in male; broad uncus and strong gnathos hook; finger-shaped anellus lobe; signum sickle-like to suboval, with keel; larvae living in a portable case made of plant debris. Three characters, viz. developed pterostigma, bilobed 8th sternite and presence of signum are not observed in this new species. However, we assigned it to *Thiotricha* because of the presence of the broad uncus, the strong hooked gnathos and the finger-shaped anellus lobe and the use of a portable case made of plant debris by the larvae.

Thiotricha prunifolivora sp. n. is superficially allied to *T. balanopa* Meyrick, 1918 from Assam, *T. cuneiformis* Meyrick, 1918 from Coorg, and *T. tethela* Bradley, 1961 from the Solomon Islands. The new species is, however, distinguished from *T. balanopa* by the absence of hair pencil in the 2nd segment of the labial palpus and from *T. cuneiformis* and *T. tethela* by the absence of the dark suffusion or fuscous mark along the dorsal margin of the forewing from base to middle. In the male genital character, *T. prunifolivora* sp. n. is closest to *T. tylephora* Meyrick, 1935, whose genitalia were figured by Clarke (1969). The shape of the forewing and the coloration of both species are, however, quite different, viz. the apex of forewing of *T. prunifolivora* sp. n. is not produced while it is produced in *T. tylephora* Meyrick and the ground color of *T. prunifolivora* sp. n. is glossy white while it is light grayish ocher in *T. tylephora* Meyrick. The male genitalia of *T. prunifolivora* sp. n. are distinguished from those of *T. tylephora* Meyrick by the shorter aedeagus which is about 1/2 the length of the whole genitalia, while it is about 2/3 the length of the whole genitalia in *T. tylephora* Meyrick. *T. prunifolivora* sp. n. is easily distinguished from the Japanese species except for *T. subocellea* (Stephens) and *T. sp.* of Suzuki and Komai by the smaller size of the adult. The new species is easily distinguished from *T. subocellea* and *T. sp.* of Suzuki and Komai by the glossy white ground color.

Some unique characters are found in the adult of the new species, viz. presence of subradial retinaculum in the male forewing; presence of a row of spine-like scales under the forewing and long hair-like scales along the costa on the hindwing which are considered as the secondary wing coupling system; presence of the venulae and apodeme in the second abdominal sternite. The presence of subradial retinaculum is known from the genus *Helcystogramma* (Hodges, 1986). The presence of the secondary wing coupling system is known from the tribes Cheraliini and Anarsiini (Dichomeridinae *sensu* Ponomarenko, 1997) (Ponomarenko, 1997). The presence of the venulae and apodeme is considered as a synapomorphy of the Gelechiinae (*sensu* Hodges, 1998). The genus *Thiotricha* is now assigned to the subfamily Pexicopiinae which is mainly defined by the absence of venulae in the 2nd abdominal sternite (Karsholt & Riedl, 1996; Hodges, 1998; Bland, 2002; Li, 2002; Park, 2004). Further morphological study of the genus *Thiotricha* is needed for clarifying

the systematic position. In the pupa, there are also unique characters, *viz.* a pair of triangular projections on the prothorax, a row of spines on the 6th and 7th abdominal tergites, a pair of oval pads armed with a row of spines on the 7th abdominal sternite, a pair of tergal triangular projections on the 10th abdominal segment. The function of these characters may be associated with the behavior of the pupa which protrudes from the portable case before emergence. The character state of what the antenna is never touch mesially is also unique within Gelechiidae.

Acknowledgments

We wish to express our hearty thanks to Dr A. Kawazoé (Toyonaka) for making us acquainted each other. We are also much indebted to Dr T. Saito (Ikeda) for allowing us to use the beautiful photos of this new species (Figs 1b–d & g). We are grateful to Drs T. Hirowatari and M. Yoshio (Osaka Prefecture University, Sakai) for giving advice and critical comment on the manuscript. Our thanks are due to Mr T. Mano (Toyota Yahagi River Institute, Toyota) for providing specimens of this new species. Ueda also thanks Prof. M. Ishii (Osaka Prefecture University, Sakai), Mr N. Hirai (Osaka Prefecture University, Sakai), Dr F. Komai (Osaka University of Art, Kanancho) and Dr Y. Nasu (Agricultural, Food and Environmental Sciences Research Center of Osaka Prefecture, Habikino) for their kind help in various way.

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摘 要

クロバイを寄主植物とする *Thiotricha* 属の1新種(鱗翅目, キバガ科)(上田達也・富士原芳久)

大阪府北部で初春にクロバイの花芽にポータブルケースを背負った小蛾類の幼虫を発見し, 飼育した結果, キバガ科の *Thiotricha* 属に所属する新種であることが判明したので成虫, 幼虫, 蛹の記載を行うとともに, 簡単な生活史も記載した. また, 日本産 *Polyhymno* 属の種についての周辺国の研究者に従い *Thiotricha* 属として扱うことを提案し, 日本産 *Thiotricha* 属のチェックリストを付与した.

Thiotricha prunifolivora sp. n. クロバイキバガ(新称)

前翅長♂, 3.0-4.5 mm; ♀, 4.7-5.0 mm. 頭部, 胸部, 前翅は光沢のある白色で, 前翅後角に茶褐色斑をもち, その上縁から翅頂に向かう茶褐色の斜帯をもつ. 日本産の他種とは著しく小さいサイズと前翅の斑紋から識別は容易である. 分布: 本州, 琉球, 寄主植物: クロバイ(ハイノキ科). 生活史: 年3化. 越冬世代幼虫はクロバイの花芽や腋芽に潜り, 内部を食い尽くした後, 花芽をケースとして背負い, 他の花芽に移動する. 第1化幼虫は実生に潜り, これをポータブルケースとして利用する. 第2化幼虫は最初実生に潜り, これをポータブルケースとした後, 葉の裏面に移り, 丸い穴を開けるように摂食する. 蛹化はケース内で起こり, 羽化の際, 蛹がケースからせり出す. 幼虫で越冬する.

(Accepted October 31, 2004)